REMARKS

The present amendments to the specification correct obvious typographical errors on page 16, line 9, page 17, line 5, and page 18, line 5, regarding the Table number referred to thereat. They also eliminate the two sentences on page 17, lines 3-4 and 6-9, inadvertently referring to drawing figures 3, 4 and 5, which were not intended to be included as part of the present application, as is readily apparent from the brief description of the drawings on page 7, lines 9-14.

By means of the present claim amendments, the non-elected process claims 5-16, 21-38, 40, 46-50, 97-106 and 136-139, as well as product claims 19, 20 and 39, have all been canceled and replaced by newly presented product claims 140-154. Also, claims 120 and 134 have been amended to change their dependencies to non-elected species claims 117 and 131, respectively. Hence, the claims currently on file and readable on the elected species are claims 1-3, 17-18, 41-45, 51-58, 67-81, 90-96, 107-108, 111-112, 115-116, 118-119, 121-122, 125-126, 129-130, 132-133, 135 and 140-154; and those withdrawn as not readable on the elected species are claims 4, 59-66, 82-89, 109-110, 113-114, 117, 120, 123-124, 127-128, 131 and 134.

As now amended, claims 112, 119, 126 and 133-134 have all had their dependencies changed so that they no longer are substantial duplicates of claims 108, 118, 122 and 132, respectively. Also, claims 70, 67-69, 90-92 and 120 have now been amended to overcome the Examiner's rejections under 35 U.S.C. 112, second paragraph. Specifically, the narrower diamond particle size range has been eliminated from claim 70, and along the same lines, the "such as" language has been eliminated from claims 74, 121 and 129. Claims 67-69 and 90-92 have been amended to eliminate the term "CVR" therefrom, and claim 74 has been amended to change the word "layer" to "coating" in lines 2 and 3 thereof so as to provide proper antecedent basis for the recitation "SiC coated diamond powder" in its dependent claims 90-92. Claim 120 has been amended to change its dependency to a parent claim drawn to an electronic package.

Claim 19, rejected by the Examiner under 35 U.S.C. 102(b) as being anticipated by Yu et al., has been canceled.

The present invention is directed to a metal matrix composite material exhibiting an exceptionally high thermal conductivity, and the use of such composite material as a substrate for LDMOS electronic packages. The composite material is comprised of a metal matrix, such as aluminum, having diamond particles dispersed therein, the diamond particles having a SiC surface conversion coating formed thereon. The processing techniques disclosed by Applicants for forming the SiC conversion coating on the diamond particles, and then incorporating the SiC coated diamond particles into the metal matrix, produce a metal matrix composite material exhibiting thermal conductivities greater than about 300W/m.k. to greater than about 600W/m.k. All of the claims presently pending in the application, including newly submitted claims 140-154, require that the composite material has a thermal conductivity within such range.

Of the presently pending claims readable on the elected species, claims 1-3, 17-18, 41-45, 51-58, 67, 70-81, 90, 93-96, 107-108, 111-112, 121-122 and 125-126 stand rejected under 35 U.S.C. 102(e) as being anticipated by Miyamoto et al.; claims 68-69 and 91-92 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. in view of McCoy; claims 115-116, 118-119, 129-130 and 132-133 stand rejected under 35 U.S.C. 103(a) as being unpatentable over McCoy in view of Miyamoto et al.; and claim 135 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Anschel et al. in view of Miyamoto et al. All of these grounds of rejection are respectfully traversed.

The principal reference relied upon by the Examiner in each of these grounds of rejection, is the Miyamoto et al. U.S. Patent No. 6,673,439. Miyamoto et al. disclose metal matrix composite materials containing SiC coated diamond particles dispersed in a metal matrix such as aluminum. According to the Miyamoto et al. process for preparing the SiC coated diamond particles, a SiC surface conversion coating is formed on the diamond particles through the vaporization of solid phase silicon monoxide. The SiC coated diamond particles are then incorporated into the metal matrix by conventional powder metallurgy processing techniques, as illustrated in Example 3 of the patent.

In Example 3, Miyamoto et al. compare SiC coated diamond particles prepared according to their conversion coating process (Inventive Example 2 in Table 1 in Example 1), with those prepared by the prior art chemical vapor deposition (CVD) process (Comparative Example 5 in Table 1 in Example 1), in the production of aluminum metal matrix composite materials. Although the patent states that the composite material employing the conversion coated diamond particles has an excellent thermal conductivity that is approximately three times as high as the thermal conductivity of the composite material employing the CVD coated diamond particles, the patent is completely silent as to any actual thermal conductivity values.

This deficiency in the Miyamoto et al. patent was recognized by the Examiner, in the first complete paragraph on page 6 of the Office Action, with respect to the thermal conductivity limitations recited in claims 51-54 and 74-77, requiring that the instantly claimed composite material has a thermal conductivity ranging from greater than about 300W/m.k. to greater than about 600W/m.k. As noted above, all of the claims presently pending in the application now contain such requirement. The Examiner's position in this regard was that these thermal conductivity limitations appeared to be a material property inherently possessed by the teachings of the reference, and that the burden is on Applicants to prove that the composite materials as described in the Miyamoto et al. patent do not necessarily or inherently possess these characteristics.

Accordingly, Applicants are submitting herewith the Declaration Under 37 CFR 1.132 of Roger S. Storm. Dr. Storm's Declaration documents the steps taken, under his supervision and direction, to duplicate the two metal matrix composite materials containing SiC coated diamond particles as described in Example 3 of the Miyamoto et al. patent, and have their thermal conductivity properties measured. In an effort to optimize these properties, based upon past composite forming experience, Dr. Storm even went so far as to substitute the high pressure squeeze casting process in place of the powder metallurgy process employed by Miyamoto et al. for forming the composites. Even so, the thermal conductivity values obtained for the two resulting composite products were only 141W/m.k. for the product containing the conversion coated diamond particles, and 143W/m.k. for the product containing the CVD coated diamond particles, both far below the thermal conductivity values ranging from greater than about 300W/m.k. to greater than about 600W/m.k. now specified in all of the presently pending claims. Hence, these thermal conductivity limitations are not a material property inherently possessed by the teachings of the reference, and thus serve to patentably distinguish the instant claims over the Miyamoto et al. patent.

Combining Miyamoto et al. with either McCoy or Anschel et al., does nothing to remedy the deficiencies of the Miyamoto et al. patent in rendering obvious the subject matter of the present claims. The metal matrix composite material taught by McCoy is, at best, nothing more than the composite material containing CVD coated diamond particles discussed above. See McCoy, column 4, lines 35-36. The heat sink components taught by Anschel et al. are merely aluminum or tin-plated copper devoid of any diamond particles, coated or otherwise. See Anschel et al., column 4, lines 39-44.

Hence, all of the presently pending claims clearly patentably distinguish over Miyamoto et al., alone or in combination with either McCoy or Anschel et al. These grounds of rejection should all therefore be withdrawn.

For the foregoing reasons, it is submitted that claims 1-4, 17-18, 41-45, 51-96, 107-135 and 140-154, all of the claims remaining in the case, are allowable, and that the application is now in condition for allowance. Reconsideration by the Examiner and an early notice of allowance are, therefore, respectfully solicited.

Respectfully submitted,

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